Atomism Versus Hylomorphism in the *Kalām* of al-Fakhr al-Dīn al-Rāzī: A Preliminary Survey of the *Maṭālib al-ʿĀliyyah*

ʿAdī Setia

Hylomorphism (theory of matter and form) and atomism (theory of atoms and accidents) have been the two main Islamic physical theories attempting to account for the structure of the world, the former defended by the philosophers (*falāsifah*) and the other by the theologians (*mutakallimūn*). Among the most articulate, erudite and effective defender of atomism is the formidable, 6th/12th century *mutakallim*, Fakhr al-Dīn al-Rāzī. Here, his geometrical arguments for atomism are presented along with an explanation as to why the *mutakallimūn* as a whole, even until today, are so committed to atomism and occasionalism.

Keywords: Atomism; hylomorphism; physical theories; *falāsifah*; *mutakallimūn*; Fakhr al-Dīn al-Rāzī; Ibn Sīnā; al-*Maṭālib al-ʿĀliyyah*.

Introduction

In the long history of Islamic philosophical thought, two contrasting theories of the fundamental structure of the physical world came to be predominant. These were the Aristotelian-Avicennan theory of form and matter (*ṣūrah wa māddah* = hylomorphism) of the great majority of the *falāsifah*,[1] and the *kalām* theory of atoms and accidents (*jawāhir wa aʿrāḍ* =

1. A notable exception is Abū Bakr Muḥammad Zakariyyā al-Rāzī, who advocated atomism and was thus criticized by Ibn Sīnā along with the *mutakallimūn*; see Shlomo Pines, *Studies in Islamic Atomism*, trans. Michael Schwarz and ed. Tzvi Langermann (Jerusalem: Magnes Press, 1997), 41ff.

ʿAdī Setia is Assistant Professor (History and Philosophy of Science), Faculty of Science, International Islamic University, Malaysia; Email: adi_setia@iiu.edu.my.

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atomism) of the great majority of the Muʿtazilite and Ashʿarite-Māturīdite *mutakallimūn*.[2] The *falāsifah*'s theory of bodies as constituted of matter and form tends to ascribe a degree of ontic and causal autonomy to nature or rather to matter that is viewed as very problematic (from both the physical and theological viewpoints) by the *mutakallimūn*, for whom the world, including matter, is totally dependent on God for every spatio-temporal instant of its existence. Also, the notion, implicit in hylomorphism, of a more or less autonomous nature operating on the basis of inherent causal principles entails a necessary connection between physical causes and effects, thus putting an external restriction on the freedom of the divine will and power.

In contrast, for the *mutakallimūn*, God is not only the ultimate transcendent inceptor (*mūjid*, *muḥdith*) and motivator (*muḥarrik*) of the world (*al-ʿālam*), He is also the proximate, immanent sustainer (*mubqī*) and administrator (*mudabbir*) of the world, directly involved through His knowledge, will and power in each and every particular aspects of the structures, processes and ends of nature. As Endress puts it, "The affirmation of atomism had been one of the solutions found by Muslim theologians for the apories of their theology—apories concerning the omnipotence and omniscience of God."[3]

Endress's study of the works of Yaḥyā ibn ʿAdī (d. 363/974), for instance, draws a valuable picture of the atomist-antiatomist polemics between an accomplished *faylasuf* and his contemporaries from among the *mutakallimīn*, especially the newly assertive Ashʿarites.[4] About a generation later Ibn Sīnā (d. 1037), in the *Shifā*,[5] *Najāt*,[6] and *ʿUyūn al-Ḥikmah*[7]

2. Notable exceptions include the Muʿtazilite, al-Naẓẓām; see Pines, 11ff; Alnoor Dhanani, *Physical Theory of Kalām* (Leiden: Brill, 1994), 172ff. Like the Ashʿarites, the Māturīdites, like al-Nasafī, were also atomists; see Mustafa Ceric, *Roots of Synthetic Theology* (Kuala Lumpur: ISTAC, 1995), 116ff; cf. Syed Muhammad Naquib al-Attas, *The Oldest Known Malay Manuscript: A 16th Century Malay Translation of the ʿAqāʾid of al-Nasafī* (Kuala Lumpur: University of Malaya Press, 1988), 67.

3. Gerhard Endress, "Yaḥyā ibn ʿAdī's Critique of Atomism" in *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften* (*ZGAIW*), 1 (1984), 155-179, on 157.

4. Idem, *The Works of Yaḥyā ibn ʿAdī* (Wiesbaden, 1977).

5. *Al-Shifāʾ*, *Al-Ṭabīʿiyyāt 1:al-Samāʿ al-Ṭabīʿī*, ed. S. Zayed and I. Madkour (Qum, 1405 H), Third Treatise, Chapters 3-5.

6. *Al-Najāt*, ed. Muhammad Taqi Danish-pazhuh (Tehran: Muʾassasah Intisharat, 1364H), 198-203.

7. Ed. ʿAbd al-Raḥmān al-Badawī (Beirut: Dār al-Qalam, 1980), 24-26.

is also drawn to a critical engagement with aspects of Greek and *kalām* physical theories including atomism.[8] An aspect of this engagement is his wide-ranging debate through correspondence with the great polymath, al-Bīrūnī (d. *ca* 1051), who also happens to be sympathetic to *kalām* atomism and criticises Ibn Sīnā for rejecting it.[9]

As is so often the case, critical engagement also brings about in its wake positive influences upon the critic from the one being criticised. Traces of these positive influences can be found in Ibn Sīnā's psychology of knowledge and his theories of causality and demonstration.[10] A much earlier philosopher, Abū Bakr Muḥammad Zakariyyā al-Rāzī (d. 925 or 935) is a staunch atomist, though his atoms are eternal entities totally at odds with the incepted, dimensionless atoms of the *mutakallimīn* whose thought he criticizes.[11] Al-Bīrūnī's contemporary in the Islamic far west, the great Ibn Ḥazm (d. 1064), rejects both atomism and hylomorphism, and proffers his own version of *creatio ex nihilo*.[12] Much earlier, right at the very dawn of Arabo-Islamic philosophy, al-Kindī (d. *ca* 870), while affirming *creatio ex nihilo*, had also rejected atomism within the context of his critical engagement with Muʿtazilite *kalām*.[13] There is little doubt that Fakhr al-Dīn al-Rāzī's (1149-1209) involvement in the atomist-hylomor-

8. Michael E. Marmura, "Avicenna and the *Kalām*" in *ZGAIW*, 6 (1990). Jean Jolivet had even suggested in his "Aux origines de l'ontologie d'Ibn Sina," in Jolivet and R. Rashed, eds., *Etudes sur Avicenne* (Paris, 1984), 19-28, that *kalām* and not Greek thought was the intellectual context of the Avicennan distinction between essence and existence—a view to which Robert Wisnovsky gave his "qualified support" in his "Notes on Avicenna's concept of thingness" in *Arabic Sciences and Philosophy* (*ASP*), vol. 10 (2000), 181-221. An interesting, somewhat technical exposition of Ibn Sina's argument against atomism is F. A. Shamsi, "Ibn Sīnā's Argument against Atomicity of Space/Time" in *Islamic Studies*, 23 (1984), 83-102. For an excellent survey and translation of Ibn Sīnā's discussion of atomism, see Paul Lettinck, "Ibn Sīnā on Atomism: Translation of Ibn Sīnā's *Al-Shifā'*, *Al-Ṭabīʿiyyāt 1: al-Samāʿ al-Ṭabīʿī*, Third Treatise, Chapters 3-5" in *al-Shajarah*, vol. 4 no. 1 (1999), 1-51. See also Dhanani, 69-70.

9. Seyyed Hossein Nasr and Mehdi Mohaghegh, eds., *Al-As'ilah wa'l-Ajwibah* (Kuala Lumpur: ISTAC, 1995), 3–4 (English introduction), 17-19 (edited text).

10. Michael E. Marmura, "Avicenna and the *Kalām*" in *ZGAIW*, 6 (1990), 177.

11. Pines, 41ff; cf. Dhanani, 90ff and Harry Wolfson, *Philosophy of the Kalām* (Cambridge, MA: Harvard University Press, 1976), 472ff.

12. See "Ibn Ḥazm" in *Encyclopedia of Islam*, 2nd edition. [hereafter EI²]

13. Peter Adamson, "Al-Kindī and the Muʿtazila" in *ASP*, 13 (2003), 45-77; Alfred L. Ivry, *Al-Kindi's Metaphysics* (Albany: SUNY, 1974), 22ff.

phist/anti-atomist controversy is preceded by and draws upon this long tradition of recurrent debates rooted in the earliest intellectual controversies between the *falāsifah* and the *mutakallimīn*[14]—debates with which he is thoroughly familiar and which he recapitulates with remarkable finesse and clarity in the *Arbaʿīn*[15] and *Muḥaṣṣal*,[16] and to which he devotes a whole volume of two hundred pages in his *kalām* magnum opus, *al-Maṭālib al-ʿĀliyyah*.[17]

It is well known that F. al-Rāzī rejects atomism in his early, philosophical work, *al-Mabāḥith al-Mashriqiyyah*,[18] as has been noted by Zarkan[19] and Gardet[20] among others, but what is less known is his strong affirmation of atomism in his later works, *al-Maṭālib*,[21] and *Sharḥ ʿUyūn al-Ḥikmah* (*SUH*)[22] and many middle-period works such as the *Arbaʿīn*[23] and *Muḥaṣṣal*.[24] While initially in favor of the matter and form theory, he later on in the course of his intellectual investigations begins to lean more and more towards the

14. See Adi Setia, "The Theologico-Scientific Research Program of the *Mutakallimūn*: Intellectual-Historical Context and Contemporary Concerns with Special Reference to Fakhr al-Dīn al-Rāzī" in *Islam & Science*, vol. 3, no. 2 (2005), 127-151; cf. Ayman Shihadeh, "From al-Ghazālī to al-Rāzī: 6th/12th Century Developments in Muslim Philosophical Theology" in *ASP*, vol. 15 (2005), 141-179. **See also Dimitri Gutas, "The Heritage of Avicenna: The Golden Age of Arabic Philosophy, *ca* 1000–1350" in *Avicenna and His Heritage: Acts of the International Colloquium, Leuven-Louvain-La-Neuve, September 8–September 11, 1999*, ed., Jules Janssens and Daniel De Smet (Leuven: Leuven University Press, 2002), 81-97.**

15. F. al-Rāzī, *Kitāb al-Arbaʿīn fī Uṣūl al-Dīn* (Hyderabad, 1934), 253ff.

16. F. al-Rāzī, *Muḥaṣṣal Afkār al-Mutaqaddimīn wa al-Mutaʾakhkhirīn min al-ʿulamāʾ wa al-ḥukamāʾ wa al-mutakallimīn* (Beirut: Dār al-Fikr al-Lubnānī, 1992), 89ff; (Cairo: Maktabah al-Kulliyyāt al-Azhariyyah, n.d.), 118ff.

17. Volume 6: 5-219. For more details on the intricate technicalities of pre-Fakhrurazian atomism, the reader is invited to access Alnoor Dhanani's most useful work, *The Physical Theory of Kalām*.

18. F. al-Rāzī, *al-Mabāḥith al-Mashriqiyah* (Beirut: Dār al-Kitāb al-ʿArabī, 1990), 2: 19ff; (Qum: Maktabah Bidār, 1966), 2:11ff.

19. Muḥammad Ṣāliḥ Zarkān, *Fakhr al-Dīn al-Rāzī wa Arāʾuhu al-Kalāmiyyah wa al-Falsafiyyah* (Beirut: Dār al-Fikr, 1963), 465ff.

20. **L. Gardet, article "Djuz'" in *EI*[2].**

21. **F. al-Rāzī**, *al-Maṭālib al-ʿĀliyyah*, Aḥmad Ḥijāzī al-Saqqā, ed., 9 vols. in 5 (Beirut: Dār al-Kitāb al-ʿArabī, 1987), 6: 29ff.

22. *SUH*, 2: 101-118 for his critical commentary on Ibn Sīnā's arguments against atomism.

23. *Arbaʿīn*, 253ff.

24. *Muḥaṣṣal* (Cairo), 115ff; *Muḥaṣṣal* (Beirut), 87ff.

Ashʿarite *kalām* point of view, which he argues for most systematically and articulately in the *Maṭālib*, a late work of philosophical *kalām*. This multivolume work was written towards the end of his life, and he apparently died before completing the last couple of volumes. As noted by Zarkān, F. al-Rāzī's engagement with atomism exhibited an initial stage of rejection, an intermediary stage of ambivalence and a final stage of complete, if self-critical, acceptance.[25]

It has also to be borne in mind that in the *Mabāḥith*, F. al-Rāzī expresses his skepticism of hylomorphism, even though he does not seem to have had rejected it outright as he does atomism.[26] At this initial stage, he may be comparable to Ibn Ḥazm who rejects both atomism and hylomorphism and proffers his own physical theory.[27] For these two thinkers, rejecting *kalām* atomism does not automatically entail accepting peripatetic hylomorphism, for, apparently, physical reality is far too complex to be constrained or exhausted by such a dichotomy. Furthermore, while F. al-Rāzī's stand with regard to atomism can be seen to have gone through the developmental stages of rejection, ambivalence and acceptance, his attitude toward hylomorphism goes in the opposite direction of initial skepticism, if not rejection, to eventual terminal rejection, as is evident in his later works. This indicates that even during the period of his initial rejection of atomism, his view is already leaning less toward *falsafah* than to *kalām*.

Matter and Form

L. Gardet's article on *hayūlā* (originally Greek *hyle* = Arabic *māddah* = matter) in the new edition of the *Encyclopedia of Islam* has given a useful, if understandably sketchy, account of the semantic transformations the term has undergone in the various philosophical systems that unfolded in Islamic intellectual history. This is not the place to go into any detail into these complex transformations, since in Ibn Sīnā's philosophy alone the terms *hayūlā* and *māddah* are already quite conceptually nuanced, sometimes even to the point of inconsistency. For the limited scope of this discussion it suffices to say that Ibn Sīnā's theory of matter and form (Greek *eidos* = *ṣūrah* = form), which engages F. al-Rāzī's attention, generally re-

25. Zarkān, 465ff.
26. *Mabāḥith* (Qum), 2: 11ff, for criticisms of atomism, and 2: 47ff for doubts about hylomorphism = *Mabāḥith* (Beirut), 2:19ff and 2: 51ff respectively.
27. Dhanani, 169-170; see also article "Ibn Ḥazm" by R. Arnaldez in *EI*^{2}.

expresses Aristotelian hylomorphism remodeled on Neoplatonic lines.[28] An important aspect of this re-expression or revision is Ibn Sīnā's postulate of an effective transcendent agent for explaining the conjunction of form and matter (seen as the two, albeit asymmetrical, potentialities), by virtue of which conjunction, individual, particular and differentiated concrete things or bodies come into actual being.

The dispute between Ibn Sīnā and the *mutakallimīn* centers not on the existence of the transcendent effective agent as such, but rather on the manner of the agent's causal efficacy and on the ontological and physical status of the twin objects of this efficacy, namely, matter and form. Ibn Sīnā's conception of *hayūlā* (*māddah jawhariyyah*) as the indestructible stuff that persists through time and change and as the underlying substratum that continues or endures on passing from one substance to another was obviously anathema to the *kalām* atomism and occasionalism[29] adopted by F. al-Rāzī in his later works. In what follows, the debate between Ibn Sīnā and F. al-Rāzī on the issue of matter and form is brought into relief through a translational survey of selected Fakhrurāzian texts, especially the *Maṭālib*.

In volume six of the *Maṭālib* which is devoted to the issue of atomism versus hylomorphism, al-Rāzī begins with a concise two-page introduction to the meaning of *hayūlā* which, for its clarity, is worthy of being translated in full here:

> We find bodies different in their forms (*al-ṣuwar*) [but] similar in their matter (*al-māddah*), such as knife, sword, axe and saw; for all of these are made of iron except that, despite their sharing in this entity [iron], each of them is different in form and shape (*al-shakl*) from the other. Hence we say that [for] these things, their *hayūlā* is iron but their forms are different. Likewise, door, bed, chair and boat commonly partake in being made from wood but are different in their shapes (*al-ashkāl*) and forms. Once you know this we then say *hayūlā* is of four ranks (*marātib*),[30] [namely] *hayūlā* of fabrication (*al-ṣināʿah*), *hayūlā* of nature (*al-ṭabīʿah*), universal *hayūlā* (*al-kull*) and prime *hayūlā*

28. For a study of Ibn Sīnā's physical theory, see Muḥammad ʿĀṭif al-ʿIrāqī, *al-Falsafat al-Ṭabīʿiyyah ʿinda Ibn Sīnā* (Cairo: Dār al-Maʿārif, 1971).
29. Here I think it is useful to view atomism as applicable to entities and occasionalism to events and processes, but, in the final analysis, atomism is reducible to occasionalism, though here is not the occasion to elaborate.
30. Variant reading, *anwāʿ* = kinds (p. 5n3).

(*al-ūlā*) [prime matter]. As for the first rank, which is the *hayūlā* of fabrication, it is every [material] body from which [something] is fabricated and in which [lies] the art of the artisan, such as the wood of the carpenters, the iron of the ironsmiths, the clay and water of the brick makers, the yarn of the weavers and the flour of the bakers. On this analogy therefore every artisan cannot avoid having a [material] body from which and in which he cultivates his art. Thus this [material] body is the *hayūlā* for that [particular fabricated] thing. As for the shapes and figures (*al-nuqūsh*) which the artisan makes in this [material] body, these are the forms. As for the second rank, it is the *hayūlā* of nature, and this is fire, air, water and earth. This is because every thing below the celestial sphere of the moon from amongst the existents—I mean the minerals, plants, and animals—are constituted of [generated from] these four [elements, i.e., fire, air, water, earth] and into which [four elements] they decompose upon corruption. As for universal *hayūlā*, it is the unqualified (*al-muṭlaq*) [absolute] body from which is obtained the totality of the bodily world—I mean the celestial spheres (*al-aflāk*), the planets (*al-kawākib*) [or/and stars], the four elements (*al-arkān al-arbaʿah*) and the three generated things (*al-mawālīd al-thalāthah*) [i.e., the three kingdoms of nature: mineral, plant and animal kingdoms]. As for the fourth rank, it is prime *hayūlā* [prime matter]. According to some of them [philosophers and theologians], it is the [minimal] parts which are not divisible (*al-ajzā'u allatī lā tatajazza'u*) [further]; while according to others [it is] the entity which subsists by itself in which corporeality inheres (*dhātun qā'imatun bi nafsihā taḥillu fīhi al-jismiyyatu*); and from this self-subsistent [entity] and [from] this receptivity [to corporeality] is generated the entity of the body (*fa yatawalladu min dhālika al-qā'imi wa dhālika al-qabūli dhātu al-jismi*). Once you know this then we say: our aim in this book is to comment on the states (*aḥwāl*) of the body inasmuch as it is a body, and to comment on the prime matter from which the body is generated. And Allāh knows best.[31]

In the *Muḥaṣṣal*, al-Rāzī briefly outlines and refutes Ibn Sīna's hylomorphism thus:

31. *Maṭālib*, 6: 5-6.

> Ibn Sīnā believes that the body is composed of matter (al-*hayūlā*) and form (*ṣūrah*). This means that spatiality (*al-taḥayyuz* = taking up space) is an attribute inhering in a thing, thus spatiality is form and its receptacle is matter. He argues for this [view] on the basis of the denial of the indivisible atom by [saying] that the body per se is one [a single continuous whole] (*wāḥid*) and [yet] it is receptive to dissection (*infiṣāl*) [discontinuity]. The recipient of a thing necessarily (*lā muḥālata*) exists together with matter, but continuity (*al-ittiṣāl*) does not endure together with discontinuity (*al-infiṣāl*), therefore the recipient of discontinuity is something other than continuity [which constitutes the body]. The response [of al-Rāzī to this] (*jawābuhu*) is: why should it not be allowed that the discontinuity be called plurality and the continuity unity? For the body to be discontinuous after having been continuous means that it becomes many after having been one; thus that which occurs and that which vanishes are unity and plurality, and both are two accidents whereas the substrate [of the accidents] is the body [and not matter].[32]

In the *ʿUyūn al-Ḥikmah*, as cited and critically commented on by al-Rāzī in his *Sharḥ ʿUyūn al-Ḥikmah*, Ibn Sīnā affirms the existence of *hayūlā* or *māddah* by arguing that a continuous mass of body can undergo (repeated) dissection, despite its being continuous. But since the contrary states of continuity and dissection (or discontinuity) cannot be both existing in one and the same thing, the continuity of the body must be due not to the body itself (since it can be dissected) but to something else, and this something else is matter (*māddah*). So continuity and dissection are not grounded in the body qua body but qua matter in which the body subsists. In short, the continuity of a body which undergoes dissection is due not to the body itself but to a substrate (*jawhar*) called matter by virtue of which the dissected body retains its intrinsic continuity. This implies that a body is in principle always divisible without ever arriving at a terminally indivisible discrete part, or at several unconnected discrete parts each of which can no longer be further dissected or split; for every part, large or small, is in itself a continuous whole due to its continuous underlying matter, and so is not analyzable into its constitutive, self-subsistent indivisible parts or atoms. Thus Ibn Sīnā says:

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32. *Muḥaṣṣal* (Cairo), 118-119; *Muḥaṣṣal* (Beirut), 89.

> Bodily [or corporeal] continuity (*al-ittiṣāl al-jismī*) exists in matter (*māddah*) [i.e., not in the actual sensible body itself], and this is so because it [the body] is receptive to dissection [or discontinuity] (*al-infiṣāl*). The receptivity [to dissection] in it [the body] is either because it [dissection] is [itself] continuity, but continuity cannot be receptive to dissection which is its contrary (*ḍidduh*). This is because it is impossible that there should be in the contrary a faculty (*quwwah*) receptive to a contrary, since that which is receptive to a thing [only] receives it when it [the recipient] is existing. It is impossible that something not existing be receptive to something existing, for the contrary becomes non-existent [or vanishes] (*yuʿdamu*) when the contrary [of the first contrary] exists [comes into being] (*wa al-ḍiddu yuʿdamu ʿinda wujūdi al-ḍiddi*), and the opposite (*muqābil*) [too vanishes] when the opposite [of the first opposite] exists. Hence the faculty of receptivity to continuity is in something [also] receptive to dissection, but dissection is other than continuity,[33] therefore [both] bodily continuity and bodily dissection is [found] in matter [i.e., not in the body *per se*].[34] And similarly so are [all] the faculties and forms which adhere to this continuity and are together with it.[35]

In clarifying what Ibn Sīnā means in the above passage, F. al-Rāzī says:

> Know that it is imperative firstly to epitomize the bone of contention. Thus we say that there is without doubt among the existents an existent that occupies space and is extended in [spatial]

33. Here the printed text has: *wa al-ittiṣāl ghayr wa al-infiṣāl*, which does not make sense since the context requires *wa al-ittiṣāl ghayr al-infiṣāl*, and so I translated it accordingly. I use the terms "discontinuity" and "dissection" interchangeably here as translation of *infiṣāl* for clarity of presentation.

34. *SUH*, 3: 19; cf. *UH*, 48, where the last four lines read differently but maintain the same general sense: "Hence the faculty of receptivity to dissection is due to something receptive to [both] dissection and continuity. Therefore bodily continuity is [found] in matter."

35. This last sentence of the pasage, *wa ka dhālika mā yatbaʿu hādhā al-ittiṣāla wa yakūnu maʿahū min al-quwā wa al-ṣuwar*, is found in the corresponding passage in the *UH*, and though missing in this particular passage in *SUH*, it is commented on by al-Rāzī at the end of his commentary of the passage; thus this sentence must have been inadvertently omitted by the scribe or by the editor.

> direction[s] (*mumtāddan fī al-jihah*). And this thing [the space-occupying extended existent] is either subsistent by itself or is subsistent in a substrate. As for the former, it is what is meant by our saying that the body is not composed of matter and form. And as for the latter, it is the view of the Shaykh [Ibn Sīnā] and of most of the philosophers before him, for they believe that this thing that is extended in the [spatial] directions and obtained in space is bulkiness (*al-ḥajmiyyah*), and that the substrate (*maḥall*) of this bulkiness is *hayūlā*, and that the sum of these two is the body (*al-jism*). This is the epitome of the bone of contention. Know that the argument of the Shaykh in this problem is founded upon denial of the indivisible atom, and upon the [fact] that the continuous body is in itself a single thing just as it is in sensible perception [also] a single thing. Once you recognize this [fact] then let us comment on this argument which he mentions. The clarification of this statement is that we say: It is established that the simple body is in itself a single thing; that is what is meant by it being continuous. But there is no doubt also about the [fact] that it is receptive to dissection, and so a person could say: This dissection is either continuity [itself] or [something] other than it. The former is invalid because the recipient must necessarily endure together with what is received. But continuity does not endure together with dissection therefore it is impossible that the recipient of dissection be continuity [itself]. Therefore it is necessary to recognize the existence of something other than continuity which is receptive to [both] this incidental dissection and that transitory continuity. Hence it is evident that the body is composed of continuity and of something else that receives continuity.[36]

In sum, F. al-Rāzī understands Ibn Sīnā to mean that a body requires a substrate receptive to both continuity and discontinuity by virtue of which the body retains its intrinsic continuity through repeated dissections.[37]

After further critical, intricate discussions of the said Avicennan passage, F. al-Rāzī brings forth three arguments to show that "it is impossible for the body to be composed of matter and form" of which the third is translated below:

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36. *SUH*, 3: 19-20.
37. Cf. al-Shahrastānī in Pines, 154ff.

> The third argument for the fallacy of the theory of matter is that matter is something that receives continuity and dissection. [However] continuity is tantamount to the state of two bodies occurring in two spaces such that a third space intervenes not between them. Dissection is tantamount to the case of their occurring in two spaces such that a third space intervenes[38] between them. Thus we say: [As for] continuity and dissection, each of them is not conceivable except in the case of something that pertains to space and exists in place and (spatial) direction [or dimension]. And every thing that is like that is a body and a space-occupier; and so, if a body has matter [in which it subsists] then that matter is the very body itself, but this is impossible. Therefore the ascription of matter to body is impossible.[39]

In sum, the composition of the body as a continuous whole and its decomposition into separate parts are explicable in terms of the body itself without postulating the existence of a more fundamental, distinct extrabodily entity called matter to serve as a substrate for the alternating bodily forms of composition and decomposition. Even if it be argued that the body is constituted of matter, this matter is none other than the body itself and not something extrabodily.

He again engages hylomorphism critically in the concluding twenty pages of volume six of the *Matālib*,[40] comprising three sections with very intricate, interesting arguments which are exemplars of conceptual analysis. With regard to the purpose of these concluding sections, he says:

> The preferred [view] according to me (*al-mukhtār ʿindī*) is that the claim for the existence of the hyle—on this interpretation [of the hyle by Aristotle, al-Fārābī and Ibn Sīnā]—is invalid (*bāṭil*). Thus it is incumbent on us to mention, firstly, the arguments of those affirming the hyle, and, secondly, to cast objections (*naʿtariḍ*) on them, and, thirdly, to construct (*nuqīm*) indubitable arguments (*al-dalā'il al-yaqīniyyah*) for the claim for the impossibility of the hyle.[41]

38. The context requires *yatakhallalu* instead of *lā yatakhallalu*.
39. See *SUH* 3: 27. Cf. *SUH* 2: 101-118, for more discussions on F. al-Rāzī's critique of Ibn Sīnā's rejection of atomism.
40. *Maṭālib*, 6: 197-216.
41. *Maṭālib*, 6: 200.

Atoms and Accidents[42]

To replace the refuted theory of matter and form, F. al-Rāzī argues for the theory of atoms and accidents. For F. al-Rāzī the body that occupies space and extends through the spatial dimensions subsists by itself and so there is no need to postulate a separate, extrabodily material substratum, the hyle, in which the body subsists. The continuity of this self-subsistent body consists in the ordering together of discrete, indivisible self-subsisting atoms into an integral whole, while its dissection or discontinuity consists in the disintegration of this single whole into its multiple parts and ultimately into the individual discrete minimal parts, namely atoms, and thus there is also no need to postulate an enduring, extrabodily hyle that receives the alternating, transitory bodily forms of continuity and discontinuity. Here, the twin forms of continuity and discontinuity are reconceptualised as accidents that happen directly to the body itself, and so the body, and ultimately the atoms composing the body, are the substratum for the accidents not some more fundamental, underlying extrabodily hyle. Hence in F. al-Rāzī as in *kalām*, the hyle is transformed ultimately into self-subsisting discrete minimal parts, while the forms are transformed into incidental and transitory accidents that "happen" (*ʿaraḍa*) to those self-subsisting minimal parts or to self-subsisting bodies composed of those parts.[43] The most detailed, lengthy and elaborate arguments for atomism are presented in the two hundred-page volume six or sixth book of the *Maṭālib* in which he also devotes almost equal space to the counter-arguments of the anti-atomists. He may indeed be a staunch atomist, but he certainly cannot be faulted for failing to give the opposing camp more than their share of a fair hearing! Before going into some of F. al-Rāzī's arguments for atomism, it shall be useful to recapitulate his discussions on the various definitions of the body.

Simple Whole and Complex Whole

F. al-Rāzī rightly says that our definition of the body (or any particular body for that matter insofar as it is a body) will depend on whether we consider it to be an integral complex of discrete minimal parts or to be

42. Cf. the masterful analysis by Richard M. Frank, "Bodies and Atoms: The Ashʿarite Analysis" in *Islamic Theology and Philosophy: Studies in Honor of George F. Hourani* (Albany: State University of New York Press, 1984), 39-53.

43. Cf. al-Ījī's *Mawāqif* in A. I. Sabra, "Science and Philosophy in Medieval Islamic Theology: the Evidence of the fourteenth Century" in *ZGAIW*, 9 (1994), 1-42, 32-33.

a unitary simple continuous whole without intrinsic parts into which it is terminally analyzable.[44] In the former case, the body is only externally a unity but internally a multiplicity, whereas in the latter case the body is both externally and internally a unity. In other words the atomistic *kalām* conception of the body is that it is a complex whole, whereas the hylomorphic *falsafah* conception is that it is a simple whole.

A corollary of the hylomorphic conception is that while there is no denying the sensible fact of the space-occupying characteristic of the body, this characteristic is, however, not essentially constitutive of the body, but is due to extraneous, accidental factors. In other words, spatial dimensions such as the one-dimensional line and the two dimensional surface, as transitory accidents, do not constitute the quiddity of the body, i.e., the body is not essentially defined by spatial dimensionality; if so, what does define it? Well, the body qua body is essentially unqualified corporeal magnitude in the sense of pure mass or density or bulkiness in which it is possible for the dimensions of length, breadth and depth to subsists. In sum, the body as such is a dimensionless corporeal, substantial magnitude which, however, is essentially composed of incorporeal matter and form.

Minimal-Part Atoms[45]

In contrast, a corollary of the atomistic conception is that space-occupation is an essential characteristic of the body by which it is defined, i.e., the body is the space-occupier or the space-occupying thing, and the atom is the smallest, indivisible space-occupier. Thus for the atomist, the body is essentially the space-occupier which occupies the three spatial dimensions of length, breadth and depth; or to put it coarsely, the body is at once "the long, the broad and the deep."[46] But what about the atom which is also a space-occupier, albeit an indivisible one? If it is indivisible then it must be dimensionless, for a one-dimensional entity, i.e., a line, can be divided, and so too can a two-dimensional or a three-dimensional entity, i.e., a surface and a body respectively, and therefore the indivisible atom cannot be a line nor a surface nor a body. It follows then that the atom must be a dimensionless, point-like spatial-entity, for the point is the only spatial entity that is not further analyzable or reducible to a simpler spatial-

44. *Maṭālib*, 6: 9ff.

45. *Maṭālib*, 6: 9-13; cf. Dhanani, 90ff.

46. Cf. Richard Sorabji, *Matter, Space and Motion: Theories in Antiquity and Their Sequel* (London: Duckworth, 1988), 23-30, for interesting parallels and contrasts with Philoponus on the nature of space and the body.

entity, hence, the atom is defined as the indivisible space-occupying entity. A necessary corollary of this definition of the atom is that the atom is indivisible in act *and* in thought—it is a physico-conceptual discrete minimal part.[47]

It is clear then that, for the atomists, the body is essentially characterized by spatial divisibility and the atom by spatial indivisibility. If this is the case, then a one-dimensional entity, a line, and a two-dimensional entity, a surface, can also by definition be a body, for these two entities are divisible, and therefore a body must at least be a line, and a line must at least be composed of two atomic dimensionless points. Some atomists balk at this overly austere, physically rarefied definition of the body, and so they suggest that the body must be composed of at least eight atoms, while others say that the body must at least have length, breadth and depth, as noted above. Apparently exasperated with this pointless conceptual hair-splitting, F. al-Rāzī dismisses the whole bodily definitional controversy with a wave of his hand, as it were, by saying that "this quarrel is linguistic not intellectual!"[48]—a mere quibble over words—and so, in the *Arbaʿīn*, he goes for the simplest definition, namely, "the body is that which is composed of two or more atoms,"[49] i.e., the body must at least be a line, however minimal. However, later on, in the *Maṭālib*, he seems to opt for the definition of the body as the "long, the broad and the deep,"[50] i.e., as a three-dimensional entity. Clearly the atomist view of the body is less physical than geometrical or conceptual, and hence more abstract than concrete in contrast to the hylomorphist view, in which matter, as the underlying extrabodily substrate, has substantial, if incorporeal, being.

Euclidean and Non-Euclidean Geometry

The next problem is that the atomistic conception of the body outlined above entails the atomistic, non-Euclidean conception of space, i.e., that space itself is not intrinsically continuous but is composed of indivisible discrete "point-spaces"; this may also be called the "lattice" conception of space.[51] It further entails, in fact, the atomistic conception of time and motion and the consequent rejection of the continuous Euclidean geometry

47. *Maṭālib*, 6: 19; cf. Dhanani, 121ff.
48. *Arbaʿīn*, 4.
49. Ibid.
50. *Maṭālib*, 6: 13.
51. Cf. Dhanani, 62ff.

of classical antiquity. This fact is noted by Zarkān[52] (and by Dhanani[53] and Pines[54] in the case of pre-Faḥkrurāzian Muslim atomists). However, we now know from modern physics and mathematics that this does not mean the rejection of geometry as such but only traditional Euclidean geometry, moreover since F. al-Rāzī also utilizes, where appropriate, Euclidean geometrical arguments for atomism against hylomorphism. The fact usually overlooked here is that the sciences of mathematics and geometry, including Euclidean geometry, are derived, abstracted and idealized, whether directly or indirectly, from the concrete, physical reality of the world, or, as Heinen would have it, "Mathematical calculations presuppose a science which establishes the actual, real existence of their objects."[55]

Therefore, if the physical reality of the world is, at least at a deeper level, atomistic, then continuous Euclidean geometry, based as it were on a hylomorphic conception of the physical world, though not totally false, can only be an approximate description of physical reality the alternative to which has to be a more accurate description based on discrete non-Euclidean geometry, which, in turn, is entailed by and derived from a "deeper," atomistic conception of physical reality. One might be tempted to say that the seeds of systemic non-Euclidean geometrical speculation can be found in the *kalām* atomistic theory of physical reality. But for normal purposes, such as in the case of determining the direction of the *qiblah* for one who is not in the immediate presence of the *Kaʿbah*, Euclidean geometry will obviously have its uses, so much so that even learning it is, for F. al-Rāzī, an individual religious obligation on the one who needs to determine the direction of the *qiblah* from afar.[56] Hence Zarkān needs not be too perplexed at F. al-Rāzī's rejection of Euclidean geometry on the one hand, due to its inherent conceptual discord with atomism, and his affirmation of the same geometry, on the other, due to its practical utility for determining the *qiblah*,[57] and even its conceptual utility for supporting certain aspects of atomism.

From the foregoing contrast between the atomistic and hylomorphic conceptions of the body, it can be seen that in both conceptions, the cor-

52. Zarkān, 433ff.
53. Dhanani, 101ff, 133ff.
54. Pines, 110n4.
55. Anthony Heinen, "*Mutakallimūn* and Mathematicians" in *Der Islam*, 55 (1978), 71.
56. *Mafātiḥ*, also cited in Zarkān, 434.
57. Zarkān, 434.

poreal body is derived from incorporeality: from incorporeal point-like atoms in the case of the former and from incorporeal prime matter and form in the case of the latter. Thus it may not be too far off the mark to say that while on the one hand the atomistic body is ultimately magnitudeless, insubstantial dimensions to which corporeal magnitudes are mere accidents, the hylomorphic body is, on the other hand, dimensionless, substantial magnitude to which the incorporeal dimensions are but accidents. In atomism, the insubstantial dimensions are essential to the body; in hylomorphism, the substantial magnitude. Can we say then that, in contrast to the hylomorphic body, the atomistic body is less material than immaterial and hence more conceptual than concrete?

At any rate, it does seem that the atomic theory of bodies and their motion and change is the simpler theory. The entitative elements of this theory is body, atoms and accidents which are reducible to two, namely atoms and accidents, since atoms are not extrabodily, whereas in the hylomorphic theory, we have body, matter and form, three distinct entitative elements since matter is extrabodily. With this comparative résumé in place, we may now survey what F. al-Rāzī has to offer in terms of detailed, rational arguments for atomism.

Arguments for and against Atomism[58]

In volume six of the *Maṭālib*,[59] before going into detailed, critical exposition of the arguments of the opposing hylomorphist camp, F. al-Rāzī presents and expounds on three main arguments of the atomists, namely, argument from considerations of the nature of motion and time, argument from the principles of geometry, and argument from the finite magnitude of the body, followed by a separate section expounding on other, supplementary arguments. The first main argument is founded upon certain atomistic conceptions of the nature of time, motion and distance: if time, motion and distance are discrete entities then, *ipso facto*, the body must be composed of atomic minimal parts. The second main argument is based, ironically, on continuous Euclidean geometry, and so it shows how geometrical continuity can be co-opted and pressed into the service of physical and conceptual discontinuity, i.e., atomic discreteness. The third main argument from finite bodily magnitude basically says that if a body of finite magnitude can be endlessly divided, this would imply that this body, though finite, is composed of an actual infinite number of

58. Cf. Zarkān, 429ff; Dhanani, 9, 148-166, 185-87; Wolfson, 466ff; Pines, 1ff.
59. *Maṭālib*, 6: 29-82.

parts, which is impossible. The section on supplementary arguments[60] is for the most part an extension of the section on geometrical arguments, and contains some interesting references to Ibn Sīnā, Euclid and Ibn al-Haytham.

After presenting the atomist arguments, F. al-Rāzī proceeds in the next very long section of over eighty pages to present in ten sub-sections the anti-atomist arguments which he engages closely with counter-arguments of his own.[61] The concluding last three, also very argumentative, sections seem to serve as a résumé of the whole of the previous discussions, though they do contain some new argumentative insights of their own.[62]

Geometrical Arguments for the Atomic Minimal Part

In a thirteen-page section entitled "Arguments derived from geometrical principles showing the existence of the indivisible atom,"[63] F. al-Rāzī presents four main geometrical arguments for the atomic minimal part which show his familiarity with the geometrical principles of Euclid whom he in fact mentions many times by name.[64] The first is the argument of the sphere stationary and rolling on a plane; the second is that of the vertical line moving on another line perpendicular to it; the third is that of the thingness and locality of a point, i.e., that the point is a real thing with a physical locus; and the fourth is that of the indivisibility of the two terminals at which a motion begins and ends. Some of his arguments are more elongated than intricate, though involving, as it must, many auxiliary sub-arguments to reinforce the persuasive thrust of the core arguments and to ward off numerous anticipated counter-arguments. He realizes that arguments founded upon the least number of premises can prove to be the most conclusive. He is also candid in admitting and showing that geometrical arguments based on Euclidean principles are like a double-edged sword that cut both ways, for and against the indivisible atom. Indeed, he even devotes a separate section of eight pages on "arguments

60. *Maṭālib*, 6: 75-82.
61. *Maṭālib*, 6: 83-165.
62. *Maṭālib*, 6: 197-216.
63. *Maṭālib*, 6: 47ff.
64. On the Arabo-Islamic reception of the *Elements*, see the extensive bibliography on "The Medieval Arabic Euclid" in John Murdoch, sv "Euclid" in *Dictionary of Scientific Biography*, 414-459 on 453-455.

derived from geometry to deny the atomic substance."[65] Here, only the first and second main geometrical arguments for atomism are translated and described, while the remaining two paraphrased.

The first main argument states that "when a real sphere touches a level surface, the locus of contact is something not divisible, and this fact entails affirming the existence of the indivisible atom."[66] He then gives four auxiliary arguments as to why the locus of contact must be something indivisible, i.e., a point:

> (a) If the locus of contact is divisible then this locus will be pressed against the level surface, and that which is pressed against a level surface is [itself] a level surface, and so entails a level surface obtaining in the sphere, [but] this is impossible. Also, if we suppose the sphere rolls, then when the [first locus of] contact passes away, there obtains a [second] contact with another, also indivisible part. [As for] this second part on which the second contact obtains, if it connects with the first [previous] locus of contact, whether at an angle or not at an angle, then the sphere [in either case] becomes straightly extended, but this is impossible [if it is a real sphere].[67]

In plain speech, the gist of this auxiliary argument is that if the locus of contact between the sphere and the level surface is divisible, then this locus will in fact not be a point but a level plane or a line. This will entail that that part of the sphere in contact with the level surface is in fact not curved but flattened, which renders the sphere not a sphere, but if the sphere is to remain truly a sphere, then the locus of contact must be an indivisible physical point. Now, when the sphere rolls, the second locus of contact must be both horizontally and angularly discontinuous with the first locus of contact, otherwise that particular part of the sphere will again be flat not round, which is of course impossible if the sphere is to remain truly a sphere. Therefore, not only does the sphere contact the level surface at an indivisible atomic physical point, but also, when the sphere rolls on the level surface, all subsequent and successive loci of contact are discrete indivisible atomic physical points. Here the adjective "physical" is to be emphasized, for F. al-Rāzī is talking about contact between physical, albeit geometrically idealized, objects. With a little imagination, a univer-

65. *Maṭālib*, 6: 131-138.
66. *Maṭālib*, 6: 47.
67. *Maṭālib*, 6: 47.

sal geometrical law can be inferred from the above argument, namely, *all loci of contact between a curvature and a plane are discrete points*.

The second auxiliary argument to prove the indivisibility of the locus of contact is as follows:

> (b) If the locus of contact is divisible, then it will be possible to draw out from the center of the sphere two lines terminating on the two extremities of the locus of contact, and these two lines together with the [base] line traced at the locus of contact [between its two extremities] become three lines surrounding a single plane, thus forming a triangle whose base is the [base] line at the locus of contact. If we draw out from the center of the circle to the base of this triangle a vertical line, then the two angles formed on both sides of this vertical line will be right-angled, and the [original] triangle, due to this drawn out vertical line, will be halved into two right-angled triangles, and the two lines falling on the two extremities [of the locus of contact] will become hypotenuses of these two right-angled triangles, and the vertical line becomes a hypotenuse of [i.e., side subtended by] the two acute angles falling on the two extremities [of the locus of contact]. It is known that the hypotenuse of [subtended by] the right angle is greater [i.e., longer] than the hypotenuse of [i.e., side subtended by] the acute angle. Thus this vertical line will be shorter than the two lines falling on the two extremities. But these three lines radiate from the center to the circumference [of the sphere] even though they are [of] unequal [lengths], but this is inconsistent. Therefore it is established that the locus of contact of this sphere [with the plane] is something indivisible, and this is what is sought.[68]

This argument is surely less intricate than elongated, and merely a slight, if tortuous, variant of the one preceding it. The straightforward gist of it is that the lines radiating from the center to the circumference of the sphere must be radii of equal lengths; but if the locus of contact between the circumference and the plane is divisible, then the locus of contact on the circumference will be flattened having two extremities such that the radii radiating from the center to the two extremities will be of a length unequal to that of the radius radiating to a point on the circumference half-way (or any fraction of the way, by the way) between the two

68. *Maṭālib*, 6: 47-48.

extremities. In short, a divisible locus of contact between the sphere and the plane entails radii of unequal lengths from the center of the sphere to their respective loci of contact on the plane, but this is impossible if the sphere is to remain a sphere, which, by definition, must have radii of equal lengths.

The following two remaining auxiliary arguments are shorter yet more interesting, the first of which even particularly funny without in any way lacking in logical rigor.

> (c) Euclid has demonstrated in the third treatise[69] that every straight line connecting between two points falling on a circle must itself falls within that circle. Hence, if the locus of contact is divisible then this will necessitate the tracing of a straight line superposed on the surface [i.e., circumference] of the circle; however this will entail that this straight line falls simultaneously both within the circle and outside it, but this is impossible.[70]

> (d) Euclid has demonstrated[71] that if one of two circles falls within the other bigger than it, the two will not contact except at a single point. If the locus of contact is divisible, then the contact will obtain on more than one point, but this is impossible.[72]

All that is very well, but just how do we go from establishing the geometrical reality of discrete atomic contact points to the physical reality of discrete atoms as such, and thereby to the atomic composition of bodies? Apparently in response to this implicit question, F. al-Rāzī says:

> By means of these four proofs, it is thereby established that the locus of contact is something indivisible; and we say [further] that if such is the case, then it is imperative to recognize the existence of the indivisible atom. This is so because when we roll the sphere over the plane a full circle, there is no doubt that whenever the locus of contact leaves a point, the locus of

69. This would correspond to Book Three of the *Elements* where the properties of chords and circles are treated; see Thomas Heath, *A History of Greek Mathematics* (Bristol: Thommes Press, 1993), 380-383.
70. *Maṭālib*, 6: 48.
71. Also in Book Three of the *Elements*.
72. *Maṭālib*, 6: 48-49.

> contact [again] obtains at another point, and there is nothing intervening between these two [successive contact] points. This is because we are speaking about that [second] point at which contact is realized at the very moment when contact ceases at the first [previous] point, and thus, on this supposition, a line is traced through a composition of these [successive contact] points; and if a line is obtained through a composition of points, then likewise a plane is obtained through a composition of lines, and a body through a composition of planes. Therefore, on this supposition, the locus of contact on a circle is something indivisible, and by the drawing together of similar indivisibles the body is obtained. Such then is what is meant by the indivisible atom.[73]

The second main argument says:

> If we suppose a line perpendicular to another line, and we further suppose that this perpendicular line moves on that other line from its beginning until its end, then this moving line will have touched with its extremity the whole length of the line being moved on, for moving on something without touching it is inconceivable. This will then entail that it should be said that the line being moved on is generated from entities touched by the extremity of the moving line, but the extremity of the moving line is a point, and [so] that touched by a point is a point [too]. Therefore the line being moved on must of necessity be composed of points, and this is what is sought.[74]

This means that a line touches another line at an indivisible point, and when the former moves along on the latter, each successive locus of contact is a point, and therefore the latter is composed of indivisible points, i.e., atoms. F. al-Rāzī then elaborates further on this argument by adducing several sub-arguments.

The third main geometrical argument says that the philosophers are agreed that the point is a real thing having an indivisible position or spot (*waḍʿ*), and this would entail the existence of the atom. Not satisfied with the demonstrative adequacy of this statement, F. al-Rāzī proceeds to prove it by giving three sub-arguments; thus he says:

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73. *Maṭālib*, 6: 48-49.
74. *Maṭālib*, 6: 52.

> Our saying that the point is a thing having an indivisible position [or situation] (*dhū waḍʿin lā juz'a lahū*) is a statement (*kalām*) comprising three provisos (*quyūd*). The first proviso: the point is a thing and the evidence for this is that a line touches another line at a point, hence if this point does not exist, then that which is characterized by touching (*al-mawṣūf bi al-mulāqāh*) does not exist at all which is self-evidently false. By this is shown the fallacy of those who say that the point has no existence except in the imagination (*wahm*); for we say that the touching obtains in concrete [i.e., external] reality (*fī al-aʿyān*), and this touching obtains on the point, hence the point necessarily exists in external reality. The second proviso is…that the point has position, i.e., it is possible to point to it sensibly (*al-ishārah al-ḥissiyyah ilayhi*). The third proviso is that the point is not receptive to division. [75]

He then gives three sub-arguments to prove the third proviso, the first of which is the previously mentioned circle-in-circle argument; the second is the argument that the point is tantamount to the extremity of a line such that if this extremity itself has length and breadth, it would then be a surface and thus not actually the extreme end of the line; and the third is that this extremity must be indivisible, otherwise it would be divisible into at least two sub-points only one and not both of which can be the extremity, but then what was at first supposed to be the extremity would turn out not wholly to be the extremity, and this is impossible. If that sub-point is again divisible, the same problem recurs with regard to it, but if it is not further divisible then the case for the actual indivisible point is proven.[76]

F. al-Rāzī's fourth geometrical argument for the indivisible atom is that the position (*al-mawdiʿ*) at which motion begins or ends must be an indivisible point. If either the initial or the terminal position of a motion is divisible into two sub-points, then this will entail that the motion actually begins or ends at two positions instead of at one position, but this is impossible.[77]

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75. *Maṭālib*, 6: 54-55.
76. *Maṭālib*, 6: 55-56.
77. *Maṭālib*, 6: 58-59.

Conceptual Role of the Atom in Islamic Philosophico-Scientific Theology

The foregoing shows F. al-Rāzī to be affirming that physical, sensible bodies are three-dimensional composition of discrete physico-conceptual dimensionless minimal parts called indivisible atoms. His arguments for the existence of the atomic part presented above are in many cases repeated with slight variations to support his atomistic theory of time, motion and space/place. Further studies will show that he also views change in general (*taghayyur*) to be atomistic in nature. What follows is a brief personal reflection on the conceptual role of atomism in *kalām* theological thought, which, by the time of F. al-Rāzī, has thoroughly integrated philosophical, mathematical and scientific themes into its discursive framework.

Kalām atomism, in keeping with its rigorous, uncompromising self-consistency, demands the "atomization of everything; bodies, properties [i.e, accidents], actions [and events], space and time have all been given an atomic structure."[78] At the end of his pioneering (within orientalism) study of Islamic atomism, Pines raises the question of the conceptual role of the atom within Islamic culture,[79] considered apart from questions of external origins which have so engrossed the attention of Wolfson, for instance, in his monumental *Philosophy of the Kalām*.[80] But, in order to handle the problem of indigenous conceptual role adequately, one has also to consider seriously the very likely possibility of an *essentially* indigenous Qurʾānic inspiration of *kalām* atomism in respect of which, engagement with non-Islamic atomism and hylomorphism may serve only to provoke its formal, theologico-scientific articulation and explication in metaphysical, geometrical and physical terms.

The assumption, implicit in many who concern themselves with questions of origins, of a linear historical influence and a concomittant largely unfiltered reception, can be quite unwarranted, especially in the light of the fact that dynamic cultures, like dynamic individuals, creatively re-conceptualize received ideas so as to integrate them within a more or less prior framework of what they deem as meaningful or intelligible. Once

78. Pines, 91; cf. the masterful analytic elaboration of Richard M. Frank, "Bodies and Atoms: The Ashʿarite Analysis" in *Islamic Theology and Philosophy: Studies in Honor of George F. Hourani* (Albany: State University of New York Press, 1984), 39-53, in which he shows that the *mutakallimūn* were aware of and concerned with the "logical coherence of their reasoning" p. 53.
79. Pines, 140-141.
80. Wolfson, 466ff.

reconceptualized and then integrated into the new, receiving intellecto-cultural context, those "appropriated" ideas acquire a fresh life and identity, as it were, with new conceptual possibilities to be discovered, explored and articulated that were quite undreamed of, even impossible, within their previous cultural contexts. To quote R. M. Frank,

> …the *kalām* formed itself from the beginning in the spontaneous exploitation of the inherent richness and flexibility of its native idiom[81]….In order to understand the *kalām*, on the contrary [i.e., in contrast to *falsafah*], one needs only the native language and tradition of Arab Islam[82]….This is not to say that the *kalām* contains no parallels with and no clear dependences upon the pagan and Christian traditions that preceded it, but rather that these dependences are chiefly to be sought on a deeper level. Most of the basic issues, though in a real sense (and for us unavoidably) "Greek," are nevertheless framed and conceived in an Islamic mode and must be so read.[83]

Hence, one may realize that historical continuity, even if easily proven, often goes hand in hand with conceptual discontinuity, and especially so, when the search for continuity mostly reflects the research interests of modern Arabists rather than the authentic intellectual concerns of the classical Muslim thinkers of the long bygone past. What can be said here regarding the Qurʾānic inspiration for the conceptual role of *kalām* atomism in Islamic metaphysics and physics will mainly be on the general, speculative level, since a separate inquiry is needed in order to do justice to the question.

Since God is the only active force operating in the world—as emphasized categorically in many Qurʾānic verses—then the only necessary causal connection obtaining in the world is that which obtains "vertically" between the world—including between each and every "worldly" entity, properties, events and processes—and this force, conceived as a separate, higher ontic order. This entails that there can be no objectively real continuity, i.e., ontic and causal intra- or inter-dependence[84] between worldly

81. Richard M. Frank, *Beings and Their Attributes: The Teaching of the Basrian School of the Muʿtazila in the Classical Period* (Albany: SUNY Press, 1978), 4.
82. Ibid, 5.
83. Ibid, 5.
84. Intra-dependence refers to internal cohesion among parts constituting an integral whole; inter-dependence refers to mutual dependence between different integral wholes.

entities and events in any linear, horizontal manner; all dependence is, without exception, vertical, i.e., the direct, immediate dependence of each and every "worldly" thing—including every part thereof, from the tiniest part to the greatest whole—on God for each and every instant of their existence, occurrence and persistence.

The Qurʾān emphasizes again and again this direct divine action in the world in verses such as: *His command, when He intended a thing, is only that He says unto it: Be! and it is*[85]; *There is not a thing but hymns His praise*[86]; *"Each day He is upon some task*[87]; and *As We began the first creation, We repeat it*.[88] Al-Attas has pointed out to the effect that it is in the light of these and similar Qurʾānic verses bearing on the true nature of causality that the original philosophical contribution and significance of *kalām* atomism or occasionalism has to be appreciated: namely as essentially an attempt to demonstrate rationally the absolute poverty of any ontic autonomy on the part of nature and all natural processes, and hence the impossibility of a real or efficacious linear or multilinear horizontal naturalistic causality.[89] Al-Attas even finds conceptual affinity between *kalām* atomism and the Ṣūfī *waḥdat al-wujūd* (unity of being); for him, the Ashʿarite conceptualization of the total ontic and causal dependence of nature on the Creator in terms of the cosmological atomistic/occasionalistic theory of the "perpetual recurrence of creation" (*tajdīd al-khalq*) already implies *waḥdat al-wujūd*.[90]

If the connection between things in the world is not linear, then it has to be systemic, but systemic connection, by its very nature, does not obtain in any gradual, evolutionary causal manner, but instantaneously, i.e., all

85. *Yā Sīn*: 82.
86. *Al-Isrāʾ*: 44.
87. *Al-Raḥmān*: 29.
88. *Al-Anbiyāʾ*: 104.
89. Syed Muhammad Naquib al-Attas, *The Mysticism of Hamzah Fanṣūrī* (Kuala Lumpur: University of Malaya Press, 1970), 190, 190 n. 31; *A Commentary on the Ḥujjat al-Ṣiddīq of Nūr al-Dīn al-Rānīrī* (Kuala Lumpur: Ministry of Culture, 1986), 210–213; Osman Bakar, "The Atomistic Conception of Nature in Ashʿarite Theology" in *History and Philosophy of Islamic Science* (Cambridge: Islamic Texts Society, 2000), 77–101; Wan Mohd Nor, *Educational Philosophy and Practice of Syed Muhammad Naquib al-Attas* (Kuala Lumpur: ISTAC, 1998), 322, 322 n. 83, 323–330 passim; all cited in Adi Setia, "Al-Attas' Philosophy of Science: An Extended Outline" in *Islam & Science*, vol. 1, no. 2 (2003), 165-214 on 184.
90. Adi Setia, "Al-Attas' Philosophy of Science," 177.

at once or not at all, hence the reconceptualization of natural causation as divinely instituted regularity, as transcendent intelligent design imposed on nature.[91] A regularity, a pattern or a rhythm, is something unitary which obtains all at once and never gradually. Divinely instituted regularity means that the regularity is something transcendent and not something generated by phenomena and inherent in them; rather the regularity is localized and instantiated in and through phenomena from "above," as it were. In other words, the regularity, though manifest in phenomena, transcends the collective capacity of phenomena to cause, generate or produce it. That this regularity is not in itself something necessary, but freely instituted, is borne out by the fact that though the phenomena express the regularity they underdetermine it (i.e., the same underlying regularity may just as well be expressed by a different set of sensible phenomena). Conversely, the same or similar phenomena could well have been expressive of a different regularity, i.e., organized similarly to express dissimilar ends or functions. This means that any particular phenomenal localization and instantiation of a natural "law" (i.e., regularity) is not strictly deducible from that law.[92] In other words, a phenomenon may conform to a natural law without in any way being entailed by it.

The implications of such a metaphysical cosmology are that causes and effects are created together and correlated within an order or integral system in which the causes are but conditions for the effects. This order or integral system is perceived through scientific inquiry as natural patterns and regularities, as 'laws of nature', which in reality only reflect God's "manner of creation" or His *sunnah* (*sunnatuLlāh*), His *tadbīr* (governance) and *taqdīr* (apportioning), since He does nothing in vain (*mā khalaqta hādhā bāṭilā*[93]) but everything in truth (*wa mā khalaqa Allāhu dhālika illā bi'l-ḥaqq*[94]). This order has a certain stability, uniformity, and persistence because God does not change the manner of His creation: "*lā tabdīla li khalqiLlāh*/There is no altering (the laws of) Allāh's creation."[95] In short, God creates both causes and effects and connects them together

91. Adi Setia, "*Taskhīr*, Fine-Tuning, Intelligent Design and the Scientific Appreciation of Nature" in *Islam & Science*, vol. 2, no. 1 (2004).

92. See the interesting discussion in Taneli Kukkonen, "Plenitude, Possibility, and the Limits of Reason: A Medieval Arabic Debate on the Metaphysics of Nature" in *Journal of the History of Ideas*, vol. 61 no. 4 (2000), 539-560.

93. (*You have not created this in vain*), *al 'Imrān*: 191.

94. (*Allah creates not all that save in truth*), *Yūnus*: 5.

95. *al-Rūm*: 30. See also *al-Aḥzāb*: 62; *al-Fāṭir*: 43; *al-Fatḥ*: 23, for verses of like import.

within a dynamic, "unified network of events and relations,"[96] hence rendering physical, sensible nature "symbolic" or *āyātī*, as an aid to scientific/pragmatic knowledge and understanding of its underlying abstract, intelligible patterns, and thereby to intellecto-spiritual appreciation of divine wisdom and providence, ultimately.

Theologians, philosophers and scientists perceive and describe an aspect of this integral, systemic regularity in terms of a certain linear spatio-temporal order of priority and posteriority seen to be governing things and events in nature, some of which they posit as antecedent 'causes' ('substrate', 'substratum') for others, the consequent 'effects', whereas in reality, causal efficacy lies with God alone.[97] As summed up by Guiderdoni, "the regularities observed in the world are not due to causal connection, but to a constant conjunction between the phenomena, which is a custom established by God."[98] *Kalām* atomism/occasionalism may well have been the only empirically viable physical theory compatible with this metaphysics of efficient causality—the metaphysics of the "unitary direct cause of each and every created [i.e., "worldly"] existent."[99]

Conclusion

Kalām atomism or theory of physical discreteness is more about the fundamental or essential structure of physical (i.e. created) reality. This theory claims that *if* the world was created, *then* it must be made up of discrete, atomic parts. Hence *kalām* atomism or physics is substantially motivated by the Qur'ānic metaphysics of creation, and only formally inspired by certain aspects of Greek or even Indian atomism. And when

96. Stanislav Grof, "East and West: Ancient Wisdom and Modern Science" in idem, ed., *Ancient Wisdom and Modern Science* (Albany, NY: State University of New York Press, 1984), 3–23 on 10.

97. Paraphrase of Yamine Bouguenaya Mermer, "Cause and Effect in the *Risale-i Nur*" in proceedings of the *Third International Symposium on Bediuzzaman Said Nursi: The Reconstruction of Islamic Thought in the Twentieth Century and Bediuzzaman Said Nursi*, trans. Sükran Vahide, vol. I (Istanbul: Sözler Nesriyet, 1997), 40–52 on 45.

98. Bruno Guiderdoni, "How Did the Universe Begin? Cosmology and Metaphysics for the XXIst Century," pp. 1–9 on 6, conference papers, Conference Manual, International Conference on Religion and Science in the Post-Colonial World, organized by the Center for Religious and Cross-Cultural Studies, Gadja Mada University, Yogyakarta, Indonesia and the Templeton Foundation, USA, January 2–5, 2003.

99. Michael Marmura, "Ghazali's Chapter on Divine Power in the *Iqtiṣād*" in *ASP*, 4 (1994), 279-315, on 279.

the *mutakallimūn* talk about parts, they mean all that partake of the physical world, bodies, qualities, space, time, change, motion. So even the abstract, non-sensible aspects of the physical world are understood in atomistic terms.

For *kalām* atomism to be self-consistent, even the indivisible, "self-subsisting" atomic substance has to be ultimately also "accidents" relative to God, so the distinction atom-accident is not absolute with respect to entities/events in creation, meaning A may be an atom/body/substance relative to B but an accident/event/happening relative to C, but, relative to God, all three are accidents undergoing a perpetual process of coming into and passing out of being.

This means that the atom-accident distinction is only "*iʿtibārī*" (i.e., cognitive, epistemological or "mentally posited"[100]), for that is how our minds find the phenomenal world intelligible to the understanding. At a deeper, ontological level, though, all are accidents, so atomism can ultimately be reduced to occasionalism, or the metaphysics of direct, unmediated divine action. Therefore, *kalām* atomism can be seen as a monumental intellecto-scientific *ijtihād* of the *mutakallimūn* to develop and refine a theory about the world that can account for its physical aspects in a way that is conceptually compatible with that metaphysics without compromising divine power or involvement in any way.

Seen as a way to demonstrate and explore through rational and scientific argument the inherent harmony between revealed metaphysics and the physics that is intuitively experienced through our shared, sensible interaction with the world, *kalām* atomism even has direct relevance for modern physicists as they find themselves increasingly grappling, with limited success, with questions that overlap the hazy disciplinary boundary between science and metaphysics.[101]

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100. S. M. N. al-Attas, *Prolegomena to the Metaphysics of Islam: An Exposition of the Fundamental Elements of the Worldview of Islam* (Kuala Lumpur: ISTAC, 2002), p. 321, and also in this context, p. 331 ff. for al-Attas' interpretation of the "Six Days of Creation".

101. M. B. Altaie, "*Daqīq al-Kalām*: The Islamic Approach to Natural Philosophy," based on a talk given at the Institute of Arab and Islamic Studies, University of Exeter, U.K., January 26, 2005, accessible online at *http://www.cosmokalam.com/kalam/articles/natural_philos.pdf*; idem, "The Scientific Value of Dakik al-Kalam" in *Islamic Thought and Scientific Creativity*, vol. 5, no. 2 (1994), accessible online at *http://www.muslimphilosophy.com/ip/dakik.pdf*.